



DECLARATION

The undersigned, of the below address, hereby certifies that he/she is conversant with the English and Japanese languages. He/She further certifies that to the best of his/her knowledge and belief the attached English translation is a true and correct translation of U.S. Provisional Patent Application Serial No. 60/463,994 filed on April 17, 2003.

He/She further declares that all statements made herein of his/her own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 21st day of July, 2004

Signature:

A handwritten signature in black ink, appearing to read "Shiro Terasaki", written over a horizontal line.

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[Document Name] Specification

[Title of the Invention] Garment With Crotch

[Claims]

[Claim 1] A garment with a crotch for covering
5 at least part of a lower half of a body, characterized
in that

a band-like tightening portion has, at a front
side portion corresponding to a front side of a thigh,
a thigh front side tightening portion formed obliquely
10 from above to below the front-side portion and, at a
rear side portion corresponding to a rear side of the
thigh, a thigh rear side tightening portion formed
obliquely from above to below the rear side portion.

[Claim 2] A garment with a crotch according to
15 claim 1, characterized in that the thigh front side
tightening portion and the thigh rear side tightening
portion respectively incline in opposite directions
with respect to a vertical direction when seen from
the front side or rear side.

[Claim 3] A garment with a crotch according to
20 claim 1, characterized in that the thigh front side
tightening portion and the thigh rear side tightening
portion respectively incline in same direction with
respect to a vertical direction when seen from the
25 front side or rear side.

[Claim 4] A garment with a crotch according to

claim 3, characterized in that the thigh front side tightening portion and the thigh rear side tightening portion are continuous on at least either an inside of the thigh or an outside of the thigh.

5 [Claim 5] A garment with a crotch according to any one of claims 1 to 4, characterized in that part of the tightening portion is formed at a portion corresponding to a greater trochanter.

10 [Claim 6] A garment with a crotch according to any one of claims 1 to 5, characterized in that the tightening portion further has, at the front side portion corresponding to a front side of a crus, a crus front side tightening portion formed obliquely from above to below the front-side portion and, at the rear side portion corresponding to a rear side of the crus, a crus rear side tightening portion formed obliquely from above to below the rear side portion.

15 [Claim 7] A garment with a crotch for covering at least part of a lower half of a body, characterized in that

20 a band-like tightening portion has, at a front side portion corresponding to a front side of a crus, a crus front side tightening portion formed obliquely from above to below the front-side portion and, at a rear side portion corresponding to a rear side of the curs, a crus rear side tightening portion formed

obliquely from above to below the rear side portion.

[Claim 8] A garment with a crotch according to claim 6 or 7, characterized in that the crus front side tightening portion and the crus rear side tightening portion respectively incline in opposite directions with respect to a vertical direction when seen from the front side or rear side.

[Claim 9] A garment with a crotch according to claim 6 or 7, characterized in that the crus front side tightening portion and the crus rear side tightening portion respectively incline in same direction with respect to a vertical direction when seen from the front side or rear side.

[Claim 10] A garment with a crotch according to claim 9, characterized in that the crus front side tightening portion and the crus rear side tightening portion are continuous on at least either an inside of the crus or an outside of the crus.

[Claim 11] A garment with a crotch according to any one of claims 1 to 10, characterized in that part of the tightening portion is formed at a portion corresponding to at least either an inside of a knee or an outside of the knee.

[Claim 12] A garment with a crotch according to any one of claims 1 to 11, characterized in that the tightening portion further has a below-knee

tightening portion which is formed from a portion corresponding to the inside of the knee and a portion corresponding to the outside of the knee to a portion corresponding to the area below the knee, and

5 an upper edge of the below-knee tightening portion forms a recess.

 [Claim 13] A garment with a crotch according to claim 12, characterized in that the tightening portion is formed to further extend from a lower portion of the below-knee tightening portion to a portion corresponding to at least either one of an inner side of an ankle and an outer side of the ankle.

 [Claim 14] A garment with a crotch according to claim 13, characterized in that the portion corresponding to an upper side of the knee is formed of a soft tightening portion having a softer tightening portion than that of the tightening portion.

 [Claim 15] A garment with a crotch according to claim 1, characterized in that

20 the garment has a hem part formed in a portion corresponding to the area above a knee, and

 at least either the lower end of the thigh front side tightening portion or the lower end of the thigh rear side tightening portion is located at the hem part.

25 [Detailed Description of the Invention]

[0001]

[Technical Field to Which the Invention Belongs]

The present invention relates to a garment with a crotch and, more particularly, to a sports garment with a crotch.

[0002]

[Prior Art]

Some conventional sports garment with a crotch has a support portion with a strong tightening force at a predetermined portion of the garment in order to support the motion of the leg muscles. For example, patent reference 1 discloses a garment with a crotch which supports the motion of the muscles by clamping the thigh, knee, and calf with support portions from the left and right. When wearing this garment with a crotch, the support portions suppress the motion of the leg in the left-to-right direction, so the motion of the leg in the back-and-forth direction becomes stable. This garment also has the effect of supporting the bending and stretching motion of the hip joint and knee joint.

[0003]

[Patent Reference 1]

Japanese Patent Laid-Open No. 10-110306

[0004]

[Problems to be Solved by the Invention]

However, in addition to bending and stretching motions, the motions of the body include inner and outer pivoting motions, inner and outer rotating motions and the like, and in the case of the garment with a crotch disclosed in the Patent Reference 1, it is difficult to support these other motions, even if bending and stretching motions can be supported.

[0005] It is, therefore, an object of the present invention to provide a garment with a crotch which supports the motion of the leg with a good balance.

[0006]

[Means for Solving the Problems]

According to the present invention, a garment with a crotch for covering at least part of a lower half of a body, characterized in that a band-like tightening portion has, at a front side portion corresponding to a front side of a thigh, a thigh front side tightening portion formed obliquely from above to below the front-side portion and, at a rear side portion corresponding to a rear side of the thigh, a thigh rear side tightening portion formed obliquely from above to below the rear side portion.

[0007] According to the present invention, as the wearer's thigh is clamped by the thigh front side tightening portion and thigh rear side tightening portion which have a large tightening force, muscles

in the front and rear sides of the thigh can be supported with a good balance, so that the leg can pivot inwardly and outwardly and rotate inwardly and outwardly easily.

5 [0008] In the garment with a crotch according to the present invention, the thigh front side tightening portion and the thigh rear side tightening portion respectively incline in the same direction with respect to a vertical direction when seen from a front
10 side or rear side. The thigh front side tightening portion and the thigh rear side tightening portion may incline in opposite directions with respect to the vertical direction when seen from the front side or rear side. In this case, the thigh front side
15 tightening portion and the thigh rear side tightening portion are preferably continuous to each other at least on either one of an inner side of the thigh and an outer side of the thigh. Furthermore, part of the tightening portion is preferably formed at a portion
20 corresponding to a greater trochanter.

[0009] According to the present invention, a garment with a crotch for covering at least part of a lower half of a body is characterized in that a band-like tightening portion has, at a front side
25 portion thereof corresponding to a front side of a crus, a crus front side tightening portion formed

obliquely from above to below the front-side portion
and, at a rear side portion thereof corresponding to a
rear side of the crus, a crus rear side tightening
portion formed obliquely from above to below the rear
side portion.

[0010] According to the present invention, as the
wearer's crus is clamped by the crus front side
tightening portion and crus rear side tightening
portion which have a large tightening force, muscles
in the front and rear sides of the crus can be
supported with a good balance, so that the leg can
pivot inwardly and outwardly and rotate inwardly and
outwardly easily.

[0011] In the garment with a crotch according the
present invention, the crus front side tightening
portion and the crus rear side tightening portion
preferably incline in the same direction with respect
to a vertical direction when seen from the front side
or rear side. The crus front side tightening portion
and the crus rear side tightening portion may incline
in opposite directions with respect to the vertical
direction when seen from the front side or rear side.
In this case, the crus front side tightening portion
and the crus rear side tightening portion are
preferably continuous to each other at least on either
one of an inner side of the crus and an outer side of

the crus.

[0012] In the garment with a crotch according to the present invention, part of the tightening portion is preferably formed at a portion corresponding to at least either one of an inner side of a knee and an outer side of the knee. Then, at least either one of the inner side of the knee and the outer side of the knee is supported by part of the tightening portion, so the motion of the knee in the left-to-right direction is suppressed, and the motion of the leg in the back-and-forth direction is stabilized. As a result, the knee joint can bend and stretch easily.

[0013] In the garment with a crotch according to the present invention, the tightening portion preferably further has a below-knee tightening portion formed to extend from a portion corresponding to an inner side of a knee and a portion corresponding to an outer side of the knee to a portion corresponding to a lower side of the knee, and an upper edge of the below-knee tightening portion preferably forms a recess. Then, the inner side, outer side, and the lower side of the wearer's knee are firmly supported by the below-knee tightening portion having a large tightening force. Hence, the knee can be stabilized, and any unwanted motion of the knee can be suppressed.

[0014]

[Mode of Carrying Out the Invention]

The embodiment of the present invention will be described with reference to the drawings. The same elements are denoted by the same reference numerals, and a repetitive description thereof will be omitted.

[0015] Prior to a description of the embodiment, the skeletal and muscular system used when describing the function of the present invention will be described with reference to Figs. 1 and 2. Fig. 1 is a view showing the muscles and bones when the legs of the human body are seen from the front side, and Fig. 2 is a view showing the muscles and bones when the legs of the human body are seen from the rear side. As shown in Fig. 1, a long adductor 102, pectineus 103, and sartorius 104 are arranged in the front side of the thigh, and a long peroneal 108, tibialis anterior 109, long extensor 110 of toes, gastrocnemius 111, and soleus 112 are arranged in the front side of the crus. As shown in Fig. 2, a great adductor 101, semitendinous 105, biceps 106 of the thigh, and semimembranous 107 are arranged in the rear side of the thigh, and the gastrocnemius 111 and soleus 112 are arranged in the rear side of the crus. Figs. 1 and 2 show a greater trochanter 113. Note that Figs. 1 and 2 show typical muscles and bones, and the muscles and bones to be supported in the present

invention are not limited to them.

[0016] Sports spats 1 (sports garment with a crotch) of this embodiment will be described with reference to Figs. 3 and 4. Fig. 3 is a front view of sports spats 1, and Fig. 4 is a rear view of the sports spats 1.

[0017] As shown in Figs. 3 and 4, the sports spats 1 cover a range of the hips to the crus, and have band-like tightening portions 2. The main body and a tightening portion 2 of the sports spats 1 are formed of a stretchable material. As the stretchable material, for example, power net, satin net, triconet, two-way tricot, and two-way russel can be raised. The material of the main body and tightening portion 2 will be described through practical examples. For example, two-way tricot (56-dtex polyester yarn with a mixing ratio of 82%, 55-dtex polyurethane yarn with a mixing ratio of 82%) is used to form the main body cloth, and satin power net (55-dtex nylon yarn with a mixing ratio of 82%, 310-dtex polyurethane yarn with a mixing ratio of 18%) is used to form the tightening portions. In this manner, the tightening portion 2 is formed of a stretchable material in the same manner as the main body portion of the sports spats 1, but the tightening force of the fabric is stronger in the tightening portion 2. This is the characteristic

feature of the present invention.

[0018] The width of the tightening portion differs depending on the portion where it is to be formed and on the size of the garment, and accordingly it is difficult to numerically define it simply, but generally a tightening portion is preferably formed with a width of 2 cm or more in average, and more preferably 3 cm or more. A tightening portion corresponding to a portion to be supported with a particular focus is preferably formed with a width of 5 cm or more. This will be described in detail. For example, the width of a tightening portion in contact with a calf is preferably about 2 cm to 6 cm, and that of a tightening portion in contact with the inner knee or outer knee is preferably 3 cm or more (more preferably about 5 cm to 10 cm). The width of a tightening portion in contact with a thigh is preferably about 3 cm to 8 cm, and that of a tightening portion in contact with a greater trochanter and hips is preferably 4 cm or more (in some cases, about 8 cm to 15 cm). Furthermore, a wide portion of about 20 cm may be formed partially. These values are examples with reference to an M-size garment as the criterion.

[0019] The tightening portion 2 may be formed of one continuous cloth, or a plurality of cloths. To

form the tightening portion 2, it is preferable to overlay a cloth with a strong tightening force on the outer side of a main body cloth that can stretch in two directions. Alternatively, a cloth with a strong tightening force may be overlaid on the inner side of the main body cloth.

[0020] If the tightening portion 2 is formed to connect, e.g., the greater trochanter and a portion around the knee or the portion around the knee and the ankle with the shortest distance, it can apply a tension to muscles in contact with it more easily. When, for example, the shortest distance is to form a straight line, it need not form a straight line, but may form, e.g., a curved line obtained by swelling the straight line upward with its two end points as the fulcrums, or a curved line obtained by swelling the straight line downward.

[0021] As shown in Fig. 3, the tightening portion 2 has a thigh front side tightening portion 2b at its portion 1a corresponding to the front side of the thigh, and crus front side tightening portions 2e and 2f at its portion 1b corresponding to the front side of the crus. As shown in Fig. 4, the tightening portion 2 has thigh rear side tightening portions 2c and 2d at its portion 1c corresponding to the rear side of the thigh. Although this embodiment is

described by classifying the tightening portion 2 into a thigh portion and crus portion, this classification is made for the sake of descriptive convenience and does not mean that the tightening portion 2 is separated into a thigh portion and crus portion. The features of the respective tightening portions will be described.

[0022] The thigh front side tightening portion 2b shown in Fig. 3 is, at the portion 1a corresponding to the front side of the thigh, formed obliquely from above the outer side to below the inner side of the portion 1a. This will be described in more detail. The upper portion of the thigh front side tightening portion 2b is located at that position of the spats 1 which corresponds to the greater trochanter 113, and the lower portion of the thigh front side tightening portion 2b is located at that position of the spats 1 which corresponds to the inner side of the knee joint. The thigh front side tightening portion 2b is formed to be able to support the sartorius 104 between its upper and lower portions. With the thigh front side tightening portion 2b, the motion of the sartorius 104 which binds the muscles in the front surface of the thigh is supported. If the thigh front side tightening portion 2b is in contact with that portion of the front surface of the thigh which extends from

below the inner side to above the outer side of the thigh, preferably from the inner knee to the greater trochanter, it can support the motion of the sartorius 104 even when it is not in contact with the sartorius 104. That portion of the thigh front side tightening portion 2b which is above the greater trochanter 113 is formed to extend upward from the greater trochanter 113 along the side portion of the hip.

[0023] The crus front side tightening portion 2e shown in Fig. 3 is, at the portion 1b corresponding to the front side of the crus, formed obliquely from above the inner side to below the outer side of the portion 1a. This will be described in more detail. The upper portion of the crus front side tightening portion 2e is located at a portion corresponding to the inner side of the knee joint, and the lower portion of the crus front side tightening portion 2e is located at a hem portion corresponding to the lateral malleolus of the ankle. The crus front side tightening portion 2e is formed to be able to support the long peroneal 108 between its upper and lower portions. With this crus front side tightening portion 2e, the motion of the long peroneal 108 is supported. The upper portion of the crus front side tightening portion 2e need not be located at the portion corresponding to the inner side of the knee

joint, but suffices as far as it reaches a more inner side (crotch side) and upper side than a portion near the center of the front side surface of the crus. The lower portion of a band-like portion formed between the upper and lower portions of the crus front side tightening portion 2e need not be formed only on the front side of the crus, but may be partly formed at the portion 1d corresponding to the rear side of the crus (see Fig. 4).

[0024] The crus front side tightening portion 2f shown in Fig. 3 is, at the portion 1b corresponding to the front side of the crus, formed obliquely from above the outer side to below the inner side of the portion 1b. This will be described in more detail.

The upper portion of the crus front side tightening portion 2f is located at a portion corresponding to the outer side of the knee joint, and the lower portion of the crus front side tightening portion 2f is located at a hem portion corresponding to the medial malleolus of the ankle. The crus front side tightening portion 2f is formed to be able to support the tibialis anterior 109, an extensor hallucis longus (not shown), long extensor 110 of toes, and long peroneal 108 between its upper and lower portions. With the crus front side tightening portion 2f, the motion of the tibialis anterior 109, extensor

hallucis longus, long extensor 110 of toes, and long peroneal 108 is supported. The lower portion of a band-like portion formed between the upper and lower portions of the crus front side tightening portion 2f need not be formed only on the front side of the crus, but may be partly formed at the portion 1d corresponding to the rear side of the crus (see Fig. 4).

[0025] As shown in Fig. 3, the crus front side tightening portion 2e and crus front side tightening portion 2f intersect below the knee, and their upper edges form a V shape. The thigh front side tightening portion 2b, crus front side tightening portion 2e, and crus front side tightening portion 2f are formed at a portion corresponding to the periphery of the knee, while no tightening portion is formed at a portion above the knee. When the knee is supported from the three directions, the left, right, and lower directions, the knee ligament is supported properly, so the knee joint can bend and stretch easily. Also, when no tightening portion is formed at the portion above the knee, the knee can follow the motion reliably.

[0026] The width of each tightening portion formed at the portion corresponding to the periphery of the knee is preferably 3 cm to 10 cm. The tightening

portions may be formed with a constant width within this range, or different widths. When a tightening portion is formed with a different width, its portion in contact with the inner knee having a weak ligament is preferably has a width larger than that of any other portion.

[0027] The thigh rear side tightening portion 2c shown in Fig. 4 is, at the portion 1c corresponding to the rear side of the thigh, formed obliquely from above the outer side to below the inner side of the portion 1c. This will be described in more detail. The upper portion of the thigh rear side tightening portion 2c is located at a portion corresponding to the greater trochanter 113, and the lower portion of the thigh rear side tightening portion 2c is located at a portion corresponding to the inner side of the knee joint. The thigh rear side tightening portion 2c is formed to be able to support the semitendinous 105 between its upper and lower portions. With this thigh rear side tightening portion 2c, the motion of the semitendinous 105 is supported. The upper portion of the thigh rear side tightening portion 2c need not be located at the portion corresponding to the greater trochanter 113, but suffices as far as it extends at least beyond a portion near the center of the rear side surface of the thigh. That portion of the thigh

rear side tightening portion 2c which is above the greater trochanter 113 is formed to extend from the greater trochanter 113 toward the upper portion of the rear center, such that the upper ends of the left and right thigh rear side tightening portions 2c are connected to each other near the rear center of the waist line.

[0028] The thigh rear side tightening portion 2d shown in Fig. 4 is, at the portion 1c corresponding to the rear side of the thigh, formed obliquely from above the inner side to below the outer side of the portion 1c. This will be described in more detail. The upper portion of the thigh rear side tightening portion 2d is located at a portion corresponding to a portion near the hip bone connecting point (portion below the natal cleft), and the lower portion of the thigh rear side tightening portion 2d is located at a portion corresponding to the outer side of the knee joint. The thigh rear side tightening portion 2d is formed to be able to support the biceps 106 of thigh, semimembranous 107, and semitendinous 105 between its upper and lower portions. With the thigh rear side tightening portion 2d, the motion of the biceps of thigh 106, semimembranous 107, and semitendinous 105 is supported.

[0029] Since the thigh rear side tightening portion

2c and thigh rear side tightening portion 2d are not formed above the natal cleft, as shown in Fig. 4, stretch of the hips is secured. Accordingly, for example, even when the wearer bends his body forward, the garment can follow this motion easily.

[0030] As shown in Figs. 3 and 4, the thigh front side tightening portion 2b and thigh rear side tightening portion 2c are connected, with their upper portions, to each other at a portion including the greater trochanter, and are connected, with their lower portions, to each other at the inner side of the knee. On the inner side of the knee, the upper portion of the crus front side tightening portion 2e is connected to the thigh front side tightening portion 2b and thigh rear side tightening portion 2c described above. The lower portion of the thigh rear side tightening portion 2d and the upper portion of the crus front side tightening portion 2e are connected to each other on the outer side of the knee. Not both the thigh rear side tightening portion 2d and thigh rear side tightening portion 2c need be formed, but only either tightening portion may be formed. Either one of the thigh rear side tightening portion 2d and thigh rear side tightening portion 2c may only form a portion below the intersecting portion of the two tightening portions.

[0031] In this manner, when the thigh is supported from front and behind with the thigh front side tightening portion and thigh rear side tightening portion, the hip joint and knee joint can pivot inwardly and outwardly and rotate inwardly and outwardly easily. As the knee is supported from the left, right, and lower directions by part of the tightening portion, the knee is stabilized, so the knee joint can bend and stretch easily. Hence, sports spats suitable for supporting the operation of the muscles during an exercise that uses legs can be provided.

[0032] Modifications of the tightening portion 2 of the sports spats according to this embodiment will be described with reference to Figs. 5 to 8.

[0033] Fig. 5 is a front view of sports spats 1 and shows a thigh front side tightening portion 2a formed at a portion 1a corresponding to the front side of the thigh. The thigh front side tightening portion 2a shown in Fig. 5 is, at the portion 1a corresponding to the front side of the thigh, formed obliquely from above the inner side to below the outer side of the portion 1a. This will be described in more detail. The upper portion of the thigh front side tightening portion 2a is located at a portion corresponding to a portion near the pubic bone connecting point, and the

lower portion of the thigh front side tightening portion 2a is located at a portion corresponding to the outer side of the knee joint. The thigh front side tightening portion 2a is formed to be able to support the pectineus 103, short adductor (not shown), long adductor 102, and great adductor 101 between its upper and lower portions. With the thigh front side tightening portion 2a, the motion of the pectineus 103, short adductor, long adductor 102, and great adductor 101 is supported. The lower portion of the thigh front side tightening portion 2a need not be located at the portion corresponding to the outer side of the knee joint, but suffices as far as it reaches at least a more outer side (flank side) than the center line in the vertical direction of the front side of the thigh.

[0034] Fig. 6 is a rear view of sports spats 1 and shows a crus rear side tightening portion 2g formed at a portion 1d corresponding to the rear side of the crus. The crus rear side tightening portion 2g shown in Fig. 6 is, at the portion 1d corresponding to the rear side of the crus, formed obliquely from above the outer side to below the inner side of the portion 1d. This will be described in more detail. The upper portion of the crus rear side tightening portion 2g is located at a portion corresponding to the outer side of the knee joint, and the lower portion of the crus

rear side tightening portion 2g is located at a portion corresponding to the medial malleolus of the ankle. The crus rear side tightening portion 2g is formed to be able to support the gastrocnemius 111, rear peroneal (not shown), and soleus 112 between its upper and lower portions. With the crus rear side tightening portion 2g, the motion of the gastrocnemius 111, rear peroneal, and soleus 112 is supported. The lower portion of a band-like portion formed between the upper and lower portions of the crus rear side tightening portion 2g need not be formed only on the rear side of the crus, but may be partly formed at a portion corresponding to the front side of the crus.

[0035] Fig. 7 is a rear view of sports spats 1 and shows a crus rear side tightening portion 2h formed at a portion 1d corresponding to the rear side of the crus. The crus rear side tightening portion 2h shown in Fig. 7 is, at the portion 1d corresponding to the rear side of the crus, formed obliquely from above the inner side to below the outer side of the portion 1d. This will be described in more detail. The upper portion of the crus rear side tightening portion 2h is located at a portion corresponding to the inner side of the knee joint, and the lower portion of the crus rear side tightening portion 2h is located at a portion corresponding to the lateral malleolus of the

ankle. The crus rear side tightening portion 2h is formed to be able to support the gastrocnemius 111 and soleus 112 between its upper and lower portions. With the crus rear side tightening portion 2h, the motion of the gastrocnemius 111 and soleus 112 is supported. The lower portion of a band-like portion formed between the upper and lower portions of the crus rear side tightening portion 2h need not be formed only on the rear side of the crus, but may be partly formed at a portion corresponding to the front side of the crus.

[0036] Fig. 8 is a front view of sports spats 1 and shows a below-knee tightening portion 2v formed at a portion 1b corresponding to the front side of the crus. The below-knee tightening portion 2v (portion indicated by a solid line) shown in Fig. 8 is formed to extend from a portion corresponding to the inner side of the knee joint and the outer side of the knee joint to a portion on the lower side of the knee joint, and the upper edge of the below-knee tightening portion 2v forms a V shape. Accordingly, the wearer's knee is firmly supported from the inner, outer, and lower sides of the knee, so any unwanted motion of the knee is suppressed, and the knee can stretch easily. As the below-knee tightening portion 2v is formed, the bending motion of the knee is suppressed, so the patellar ligament below the knee can be protected.

The upper edge of the below-knee tightening portion 2v need not form a V shape, but may form, e.g., a U shape or crescent shape. In other words, the shape of the upper edge of the below-knee tightening portion 2v suffices as far as it forms a recess toward the lower portion of the crus. The below-knee tightening portion 2v may be formed by intersecting two tightening portions below the knee. As shown in Fig. 8, the portion corresponding to the upper side of the knee is formed of a soft tightening portion H having a softer tightening force than that of the tightening portion 2, so that a decrease in the performance of the knee to follow the motion can be suppressed. The main body portion (excluding the tightening portion 2) and soft tightening portion H of the sports spats suffice as far as they are formed of cloths having softer tightening forces than that of the tightening portion 2, or the main body portion (excluding the tightening portion 2) and soft tightening portion H may be formed of one cloth integrally.

[0037] With the tightening portion 2 of this embodiment, even when the respective portions described above are combined as will be described later, the same effect as that of the tightening portion in which the respective portions are combined

as shown in Figs. 3 and 4 can be obtained.

[0038] Regarding the combination of the portion corresponding to the thigh, the thigh front side tightening portion 2a and thigh rear side tightening portion 2d may be combined. This combination supports the inner rotating motion of the knee and the outer knee. In particular, this combination has the effect of supporting the knee not to turn to the outer side when the wearer lands on his feet. The thigh front side tightening portion 2b and thigh rear side tightening portion 2c may be combined. This combination supports the greater trochanter and the inner knee. When the greater trochanter is supported, the hip joint is supported, so the hip joint can bend and stretch easily. When a tightening portion for supporting the middle gluteus (muscle in the upper portion of the hips) is added to this combination of tightening portion, the outer pivoting motion of the hip joint can be supported. When the thigh front side tightening portion and thigh rear side tightening portion combined in this manner are seen from either the front or rear side of the spats 1, the respective tightening portions incline in the same direction with respect to the vertical direction.

[0039] The thigh front side tightening portion 2a and thigh rear side tightening portion 2c may be

combined. This combination supports the inner rotating motion of the knee and the inner rotating motion of the hip joint. The thigh front side tightening portion 2b and thigh rear side tightening portion 2d may be combined. This combination supports the outer rotating and outer pivoting motion of the knee. When the thigh front side tightening portion and thigh rear side tightening portion combined in this manner are seen from either the front or rear side of the spats 1, the respective tightening portions incline in opposite directions with respect to the vertical direction.

[0040] In this manner, when the thigh is supported from front and behind with the thigh front side tightening portion and thigh rear side tightening portion, the hip joint and knee joint can pivot inwardly and outwardly and rotate inwardly and outwardly easily. As the knee is supported from the left and right by part of the thigh front side tightening portion and part of the thigh rear side tightening portion, the knee joint can bend and stretch easily.

[0041] Regarding the combination of the portion corresponding to the crus, the crus front side tightening portion 2e and crus rear side tightening portion 2h may be combined. This combination supports

the inner rotating motion of the knee and the inner knee. The crus front side tightening portion 2f and crus rear side tightening portion 2g may be combined. This combination supports the outer rotating motion of the knee and the outer knee. When the crus front side tightening portion and crus rear side tightening portion combined in this manner are seen from either the front or rear side of the spats 1, the respective tightening portions incline in the same direction with respect to the vertical direction.

[0042] The crus front side tightening portion 2e and crus rear side tightening portion 2g may be combined. This combination supports the outer pivoting motion of the knee and the outer pivot of the crus. Hence, for example, an inside kick motion and the like in soccer are supported. The crus front side tightening portion 2f and crus rear side tightening portion 2h may be combined. This combination supports the outer pivoting motion of the knee. When the crus front side tightening portion and crus rear side tightening portion combined in this manner are seen from either the front or rear side of the spats 1, the respective tightening portions incline in opposite directions with respect to the vertical direction.

[0043] In this manner, when the crus is supported from front and behind with the crus front side

tightening portion and crus rear side tightening portion, the knee joint and ankle can pivot inwardly and outwardly and rotate inwardly and outwardly easily. As the knee is supported from the left and right by part of the thigh front side tightening portion and part of the thigh rear side tightening portion, the knee joint can bend and stretch easily.

[0044] The respective combinations of the portion corresponding to the thigh described above and the respective combinations of the portion corresponding to the crus described above may be combined. Practical examples of such case will be described with reference to Figs. 9 and 10. Fig. 9(a) is a front view of sports spats and shows a state wherein a thigh front side tightening portion 2a and crus front side tightening portion 2f are combined on the front side of the leg. Fig. 9(b) is a rear view of the sports spats and shows a state wherein a thigh rear side tightening portion 2d and crus rear side tightening portion 2g are combined on the rear side of the leg. In the spats shown in Figs. 9(a) and 9(b), on the thigh, the thigh front side tightening portion 2a and thigh rear side tightening portion 2d are formed to incline in the same direction, and on the crus, the crus front side tightening portion 2f and crus rear side tightening portion 2g are formed to incline in

the same direction. When the respective tightening portions are formed in this manner, the wearer's thigh and crus are firmly supported from front and behind. As the tightening portion in contact with the outer side of the knee is pulled by the respective tightening portions in four directions, the outer side of the wearer's knee is supported firmly. In this case, another tightening portion may also be formed so that the inner side of the knee can be supported. Then, the wearer's knee is firmly supported from the inner and outer sides.

[0045] Fig. 10(a) is a front view of sports spats and shows a state wherein a thigh front side tightening portion 2b and crus front side tightening portion 2e are combined on the front side of the leg. Fig. 10(b) is a rear view of the sports spats and shows a state wherein a thigh rear side tightening portion 2c and crus rear side tightening portion 2h are combined on the rear side of the leg. In the spats shown in Figs. 10(a) and 10(b), on the thigh, the thigh front side tightening portion 2b and thigh rear side tightening portion 2c are formed to incline in the same direction, and on the crus, the crus front side tightening portion 2e and crus rear side tightening portion 2h are formed to incline in the same direction. The upper portion of the thigh front

side tightening portion 2b and the upper portion of the thigh rear side tightening portion 2c are in contact with the greater trochanter. When the respective tightening portions are formed in this manner, the wearer's thigh and crus are firmly supported from front and behind. As the tightening portion in contact with the inner side of the knee is pulled by the respective tightening portions in four directions, the inner side of the wearer's knee is supported firmly. In this case, another tightening portion may also be formed so that the outer side of the knee can be supported. Then, the wearer's knee is firmly supported from the inner and outer sides.

[0046] The respective combinations of the portion corresponding to the thigh described above and the below-knee tightening portion 2v described above may be combined. Practical examples of such case will be described with reference to Figs. 11 and 12. Fig. 11(a) is a front view of sports spats and shows a state wherein a thigh front side tightening portion 2a and below-knee tightening portion 2v are combined on the front side of the leg. Fig. 11(b) is a rear view of the sports spats and shows a state wherein a thigh rear side tightening portion 2d is formed on the rear side of the leg. In the spats shown in Figs. 11(a) and 11(b), on the thigh, the thigh front side

tightening portion 2a and thigh rear side tightening portion 2d are formed to incline in the same direction. The lower portion of the thigh front side tightening portion 2a, the lower portion of the thigh rear side tightening portion 2d, and the upper portion on the outer knee side of the below-knee tightening portion 2v are connected to each other at the outer knee portion. When the respective tightening portions are formed in this manner, the wearer's thigh is firmly supported from front and behind. As the below-knee tightening portion 2v is in contact with the inner, outer, and lower sides of the knee and is pulled obliquely upward by the tightening portions formed on the front and rear sides of the thigh, the wearer's knee is firmly supported in three directions. Alternatively, a thigh rear side tightening portion 2c may be further formed on the spats shown in Figs. 11(a) and 11(b). In this case, the lower portion of the thigh rear side tightening portion 2c and the inner-knee-side upper portion of the below-knee tightening portion 2v are connected to each other at the inner knee portion. Then, that portion of the below-knee tightening portion 2v which is in contact with the inner knee is pulled upward toward the outer side of the thigh by the thigh rear side tightening portion 2c, and that portion of the

below-knee tightening portion 2v which is in contact with the outer knee is pulled upward toward the inner side of the thigh by the thigh front side tightening portion 2a and thigh rear side tightening portion 2d.

5 In other words, as the inner-knee-side upper portion and the outer-knee-side upper portion of the below-knee tightening portion 2v are pulled in the opposite directions at the high, the support force for the knee increases. Another tightening portion may be

10 further formed to connect to the inner-knee-side upper portion of the below-knee tightening portion 2v, and the upper portion of the tightening portion may be connected to the thigh front side tightening portion 2a or thigh rear side tightening portion 2d. A thigh

15 front side tightening portion 2b may be formed in place of the thigh front side tightening portion 2a, and a thigh rear side tightening portion 2c may be formed in place of the thigh rear side tightening portion 2d. In this case, the lower portion of the

20 thigh front side tightening portion 2b, the lower portion of the thigh rear side tightening portion 2c, and the inner-knee-side upper portion of the below-knee tightening portion 2v are connected to each other at the inner knee portion.

25 [0047] Fig. 12(a) is a front view of sports spats and shows a state wherein a thigh front side

tightening portion 2a and below-knee tightening portion 2v are combined on the front side of the leg. Fig. 12(b) is a rear view of the sports spats and shows a state wherein a thigh rear side tightening portion 2c is formed on the rear side of the leg. In the spats shown in Figs. 12(a) and 12(b), on the thigh, the thigh front side tightening portion 2a and thigh rear side tightening portion 2c are formed to incline in opposite directions. The lower portion of the thigh front side tightening portion 2a and the outer-knee-side upper portion of the below-knee tightening portion 2v are connected to each other at the outer knee portion. The upper portion of the thigh rear side tightening portion 2c is in contact with the greater trochanter. When the respective tightening portions are formed in this manner, the wearer's thigh is firmly supported from front and behind. As the below-knee tightening portion 2v is in contact with the inner, outer, and lower sides of the knee and is pulled obliquely upward by the tightening portions formed on the front and rear sides of the thigh, the wearer's knee is firmly supported in three directions. A thigh rear side tightening portion 2c may be further formed on the spats shown in Figs. 12(a) and 12(b). In this case, the lower portion of the thigh rear side tightening portion 2c

and the inner-knee-side upper portion of the below-knee tightening portion 2v are connected to each other at the inner knee portion. Another tightening portion may be further formed to connect to the inner-knee-side upper portion of the below-knee tightening portion 2v, and the upper portion of the tightening portion may be connected to the thigh front side tightening portion 2a or thigh rear side tightening portion 2c. A thigh front side tightening portion 2b may be formed in place of the thigh front side tightening portion 2a, and a thigh front side tightening portion 2d may be formed in place of the thigh rear side tightening portion 2c. In this case, the lower portion of the thigh front side tightening portion 2b and the inner-knee-side upper portion of the below-knee tightening portion 2v are connected to each other at the inner knee portion, and the lower portion of the thigh rear side tightening portion 2d and the outer-knee-side upper portion of the below-knee tightening portion 2v are connected to each other at the outer knee portion.

[0048] In this manner, when the thigh is supported from front and behind with the thigh front side tightening portion and thigh rear side tightening portion, and the crus is supported from front and behind with the crus front side tightening portion and

the crus rear side tightening portion, the hip joint, the knee joint, and ankle can pivot inwardly and outwardly and rotate inwardly and outwardly further easily. As the knee is supported from the left and right by part of each tightening portion, the knee joint can bend and stretch easily.

[0049] The relationship in inclination among the respective tightening portions between the front side of the thigh and the front side of the crus, or between the rear side of the thigh and the rear side of the crus is preferably set such that the inclinations of the tightening portions of the thigh and the inclinations of the tightening portions of the crus are opposite to each other. Then, in the entire leg including the thigh and calf, muscles necessary for the inner and outer pivoting motion and the inner and outer rotating motion can be supported with a better balance.

[0050] Regarding the tightening portions formed on the thigh and crus, it suffices as far as the tightening portions formed on one of the thigh and crus are formed to clamp the thigh or crus from front and behind. In this case, the tightening portions formed on the other may be formed to clamp the crus or thigh from the left and right. This will be described in detail. For example, on the thigh, it suffices as

far as tightening portions are formed to clamp the thigh from front and behind and are in contact with the inner and outer sides of the knee, while on the crus, it suffices as far as tightening portions are formed to clamp the crus from the left and right and to reach the hem. Alternatively, on the thigh, tightening portions may be formed to clamp the thigh from the left and right and are in contact with the inner and outer sides of the knee, while on the crus, tightening portions may be formed to clamp the crus from front and behind and to reach the hem. When the tightening portions are formed in this manner, the thigh or crus is firmly supported from front and behind, and the knee is firmly supported from the left and right. Hence, muscles necessary for respective movements in the inner and outer pivoting motion, inner and outer rotating motion, and bending and stretching motion can be supported with a good balance.

[0051] When the thigh is to be supported from front and behind with the thigh front side tightening portion and thigh rear side tightening portion, at a portion corresponding to the front or rear side of the thigh, the thigh front side tightening portion and thigh rear side tightening portion may be formed to be located at almost the same position, or to shift from each other in the vertical direction. Cases wherein

the thigh front side tightening portion and thigh rear side tightening portion are to be formed to shift from each other in the vertical direction will be described in detail. For example, there is a case wherein the thigh front side tightening portion is formed above a portion corresponding to the front side of the thigh, and the thigh rear side tightening portion is formed below a portion corresponding to the rear side of the thigh. Also, there is a case wherein the thigh front side tightening portion is formed below a portion corresponding to the front side of the thigh, and the thigh rear side tightening portion is formed above a portion corresponding to the rear side of the thigh.

[0052] When the crus is to be supported from front and behind with the crus front side tightening portion and crus rear side tightening portion, at a portion corresponding to the front or rear side of the crus, the crus front side tightening portion and crus rear side tightening portion may be formed to be located at almost the same position, or to shift from each other in the vertical direction. Cases wherein the crus front side tightening portion and crus rear side tightening portion are to be formed to shift from each other in the vertical direction will be described in detail. For example, there is a case wherein the crus front side tightening portion is formed above a

portion corresponding to the front side of the crus,
and the crus rear side tightening portion is formed
below a portion corresponding to the rear side of the
crus. Also, there is a case wherein the crus front
5 side tightening portion is formed below a portion
corresponding to the front side of the crus, and the
crus rear side tightening portion is formed above a
portion corresponding to the rear side of the crus.

[0053] The embodiment described above exemplifies
10 cases wherein present invention is applied to
ankle-length sports spats which cover the hips to crus.
The present invention can also be applied to
above-knee-length sports spats which cover the hips to
thighs, and below-knee-length sports spats which cover
15 from the hips to below-knee portions. The present
invention can also be applied to sports spats having a
portion for covering the upper half of the body above
the waist, or sports spats or sock having a portion
extending downward from the ankle across the sole of
20 the foot.

[0054] A practical example of the above-knee-length
sports spats will be described with reference to
Figs. 13(a) and 13(b). Fig. 13(a) is a front view of
the above-knee-length sports spats and shows a state
25 wherein the thigh front side tightening portion 2b
described above is formed on the front side of the

thigh. Fig. 13(b) is a rear view of the above-knee-length sports spats and shows a state wherein the thigh rear side tightening portion 2c and thigh rear side tightening portion 2d described above are formed on the rear side of the thigh. In the spats shown in Figs. 13(a) and 13(b), on the thigh, the thigh front side tightening portion 2b and thigh rear side tightening portion 2c are formed to incline in the same direction, and the thigh front side tightening portion 2b and thigh rear side tightening portion 2d are formed to incline in opposite directions. The lower end of the thigh front side tightening portion 2b, the lower end of the thigh rear side tightening portion 2c, and the lower end of the thigh rear side tightening portion 2d are located at a hem S on the inner or outer side of the thigh. When the respective tightening portions are formed in this manner, the wearer's thigh is firmly supported from front and behind. Of the lower end of a thigh front side tightening portion 2a, the lower end of the thigh rear side tightening portion 2c, and the lower end of the thigh rear side tightening portion 2d, all the lower ends need not be located at the hem S of the sports spats, but it suffices as far as at least either one lower end is located at the hem S.

[0055] In the sports spats having the portion for

covering the upper half of the body above the waist, the tightening portion to be formed above the thigh suffices as far as it is formed in the following manner. For example, on the outer side of the thigh, the tightening portion may be formed on a portion including the greater trochanter, or may be formed continuously almost linearly from the greater trochanter to the waist on the rear side. The tightening portion may extend upward from the greater trochanter along the bulge of the hips and terminate on the waist line. The tightening portion may extend from above the bulge of the hips toward the rear center and its left and right portions may be connected to each other near the rear center of the waist line. The tightening portion may extend from the greater trochanter along part of the bulge of the hips and its left and right portions may be connected to each other near the rear center of the waist line. The tightening portion may extend from the greater trochanter along the abdomen and its left and right portions may be connected to each other at the center of the abdomen. The tightening portion may be formed by combining these tightening portions.

[0056] The method of adding a tightening portion to the garment with a crotch according to the present invention is not limited to the method described in

the above embodiment. For example, a stretchable cloth having a predetermined shape may be overlaid on the main body of a garment with a crotch and be sewn together, thus forming a tightening portion, or a stretchable cloth having a predetermined shape may be overlaid on the main body of a garment with a crotch and be adhered to it, thus forming a tightening portion. According to these methods, a highly durable garment with a crotch can be manufactured easily. A tightening portion and other portions may be formed as parts having predetermined shapes, and may be connected to each other, thus forming a garment with a crotch according to the present invention. The tightening portion may be formed by the method of stretching a stretchable cloth having a predetermined shape and overlaying it on the main body of a garment with a crotch, and sewing or adhering them together. According to these methods, a strong tightening force can be obtained by the tightening portion. Alternatively, the tightening portion may be formed by the method of impregnating with an elastic resin a predetermined portion of the main body of a garment with a crotch, or adhering an elastic film to the predetermined portion of the main body of a garment with a crotch. According to these methods, a garment with a comparatively thin tightening portion can be

obtained. As the elastic resin, a polyurethane resin, a polyester elastomer resin, or other elastic resins can be employed. According to these methods, overlaying need not be performed, so a garment with a thinner tightening portion can be obtained. The tightening portion may be formed by the method of forming a knitted structure of a stretchable cloth for forming the main body of a garment with a crotch to have a strong tightening force by means of jacquard weaving such as warp knitting or circular knitting. According to these methods, overlaying need not be performed, so a garment with a thinner tightening portion can be obtained. When a circular knitted cloth or the like is to be used as a cloth for forming a garment with a crotch, the tightening portion having a relatively strong tightening force can be formed by cut-boss knitting.

[0057] Although the embodiment described above exemplifies sports spats as a typical example of a garment with a crotch, the present invention can also be applied to garments other than sports spats. For example, the present invention can also be applied to a garment with a crotch such as girdles, sports tights, spats-type swimming wear, sports wear, panty hoses, and tights.

[0058]

[Effect of the Invention]

With the garment with the crotch according to the present invention, as the motions of muscles necessary for the inner and outer pivoting motion and the inner and outer rotating motion can be supported by the band-like tightening portion, an excellent effect that the motion of the leg can be supported with a good balance can be expected.

[Brief Description of the Drawings]

[Fig. 1]

Fig. 1 is a front view showing muscles and bones when the legs of the human body are seen from the front side.

[Fig. 2]

Fig. 2 is a front view showing muscles and bones when the legs of the human body are seen from the rear side.

[Fig. 3]

Fig. 3 is a front view of sports spats.

[Fig. 4]

Fig. 4 is a rear view of the sports spats.

[Fig. 5]

Fig. 5 is a front view of sports spats.

[Fig. 6]

Fig. 6 is a rear view of the sports spats.

[Fig. 7]

Fig. 7 is a rear view of the sports spats.

[Fig. 8]

Fig. 8 is a front view of sports spats.

[Figs. 9]

5 Fig. 9(a) is a front view of sports spats, and
Fig. 9(b) is a rear view of the sports spats.

[Figs. 10]

Fig. 10(a) is a front view of sports spats, and
Fig. 10(b) is a rear view of the sports spats.

10 [Figs. 11]

Fig. 11(a) is a front view of sports spats, and
Fig. 11(b) is a rear view of the sports spats.

[Figs. 12]

15 Fig. 12(a) is a front view of sports spats, and
Fig. 12(b) is a rear view of the sports spats.

[Figs. 13]

Fig. 13(a) is a front view of above-knee-length
sports spats, and Fig. 13(b) is a rear view of the
above-knee-length sports spats.

20 [Explanation of the Reference Numerals and Signs]

1...sports spats; 2...tightening portion; 2a,
2b... thigh front side tightening portion; 2c, 2d...
thigh rear side tightening portion; 2e, 2f... crus
front side tightening portion; 2g, 2h... crus rear
25 side tightening portion; 2v... below-knee tightening
portion; 101... great adductor; 102... long adductor;

103... pectineus; 104...sartorius; 105...
semitendinous; 106... biceps of thigh; 107...
semimembranous; 108... long peroneal; 109... tibialis
anterior; 110... long extensor of toes; 111...
5 gastrocnemius; 112... soleus; 113... greater
trochanter; H... soft tightening portion; S... hem

[Document Name] Abstract

[Abstract]

[Problem] To support the motion of the leg with a good balance.

5 [Solving Means] A band-like tightening portion has, at its front side portion 1a corresponding to the front side of a thigh, a thigh front side tightening portion 2b formed obliquely from above to below the front-side portion 1a, at its rear side portion
10 thereof corresponding to a rear side of the thigh, a thigh rear side tightening portion formed obliquely from above to below the rear side portion and, at its front side portion 1b corresponding to the front side of the crus, crus front side tightening portions 2e
15 and 2f formed obliquely from above to below the front side portion 1b. The thigh is supported from front and behind with the thigh front side tightening portion 2b and the thigh rear side tightening portion.

[Selected Figure] Fig. 3

Fig.1

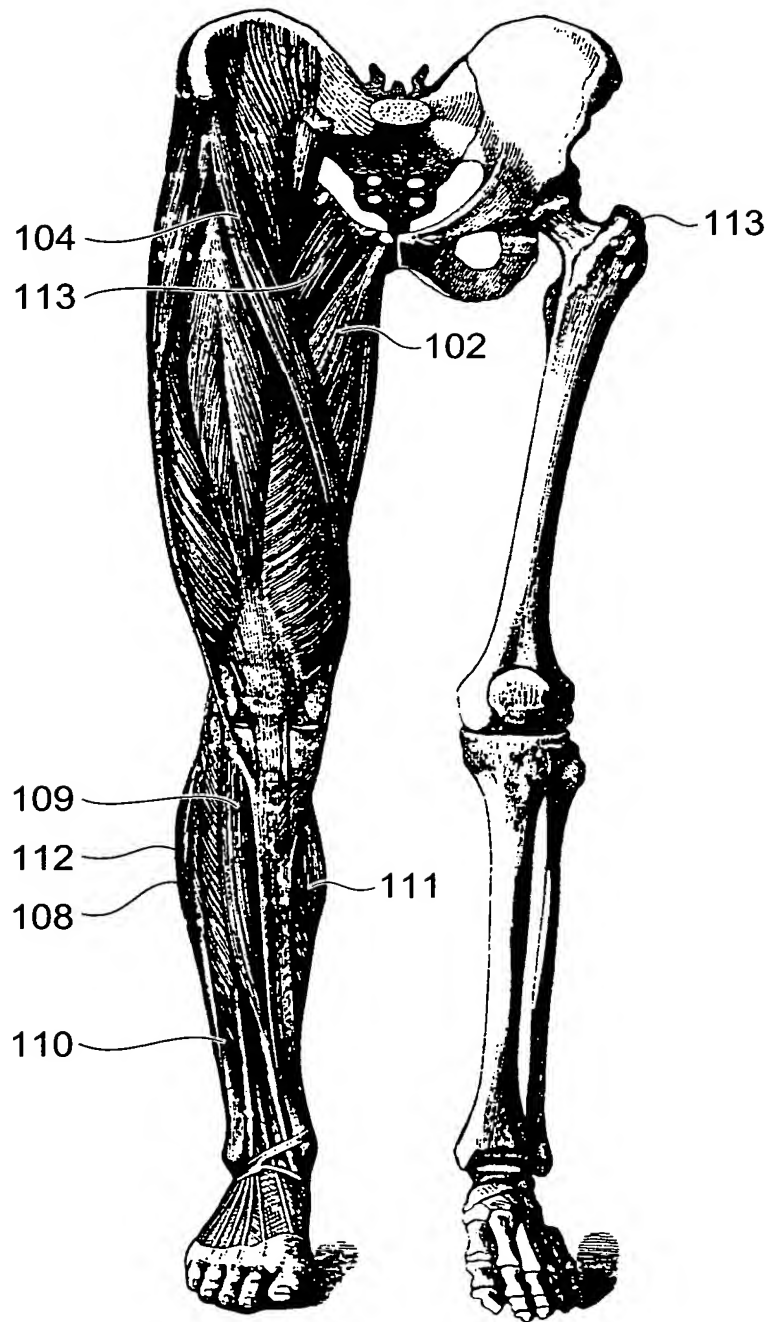


Fig.2

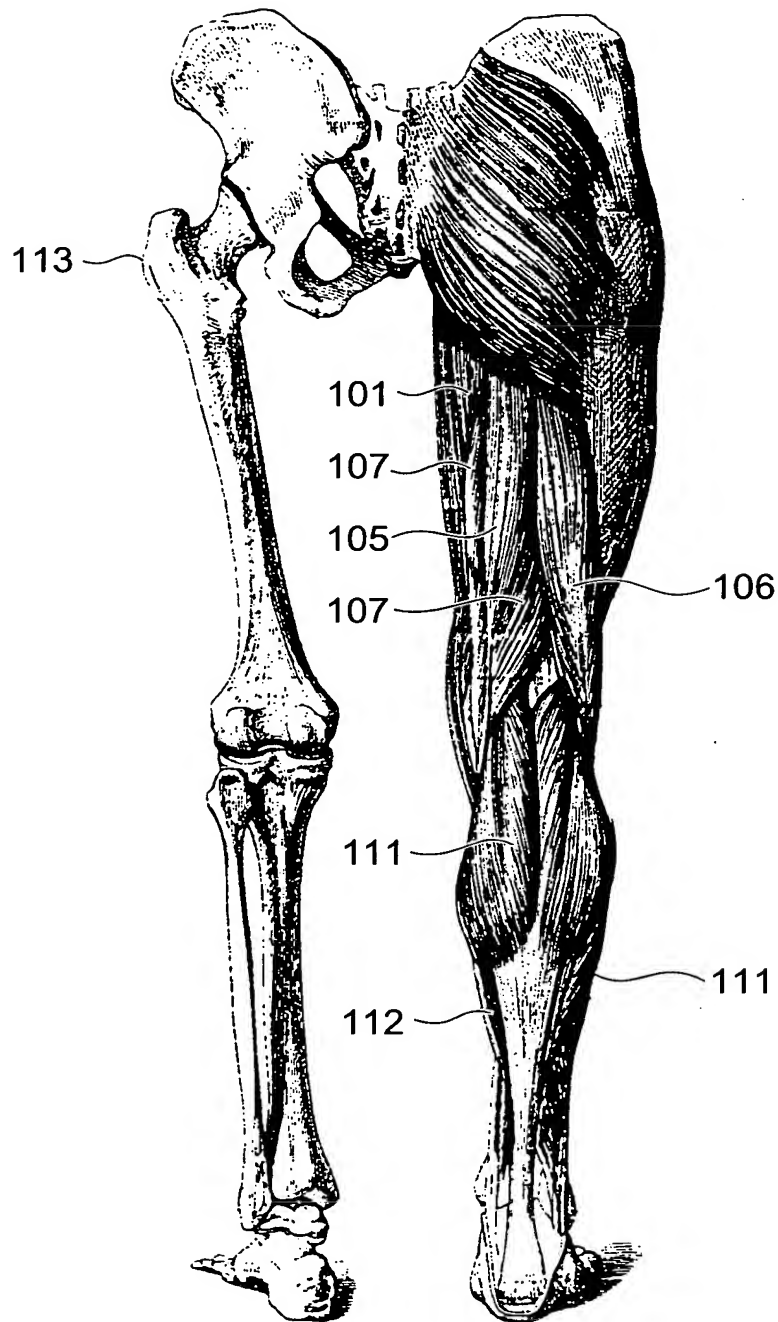


Fig.3

1
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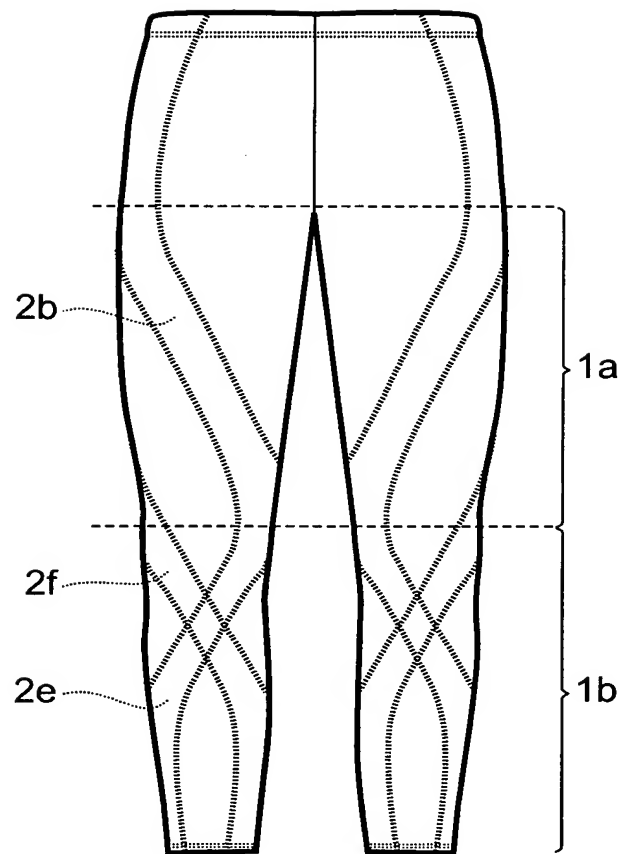


Fig.4

1
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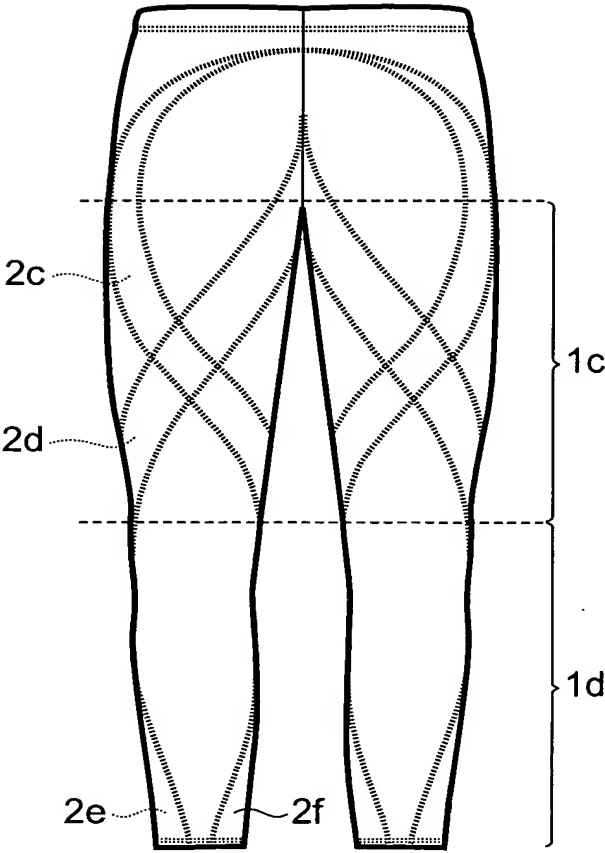


Fig.5

1
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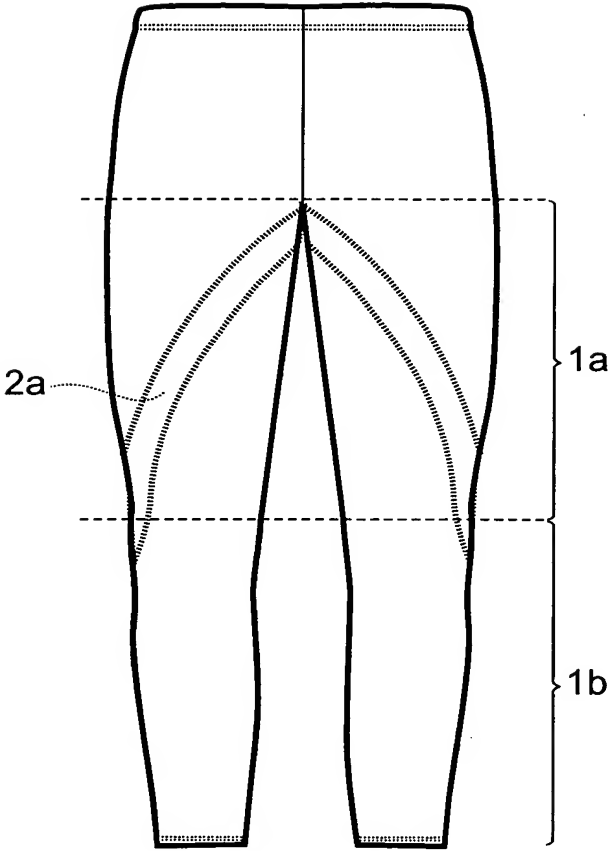


Fig.6

1
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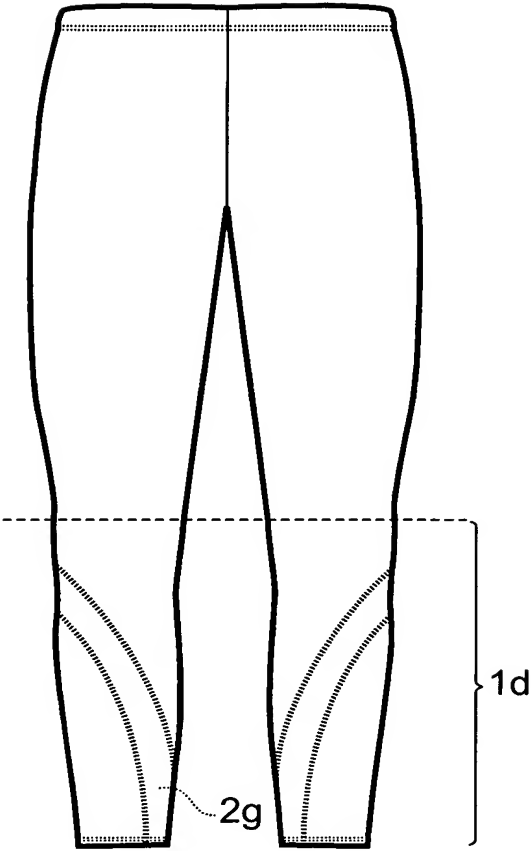


Fig.7

1
↙

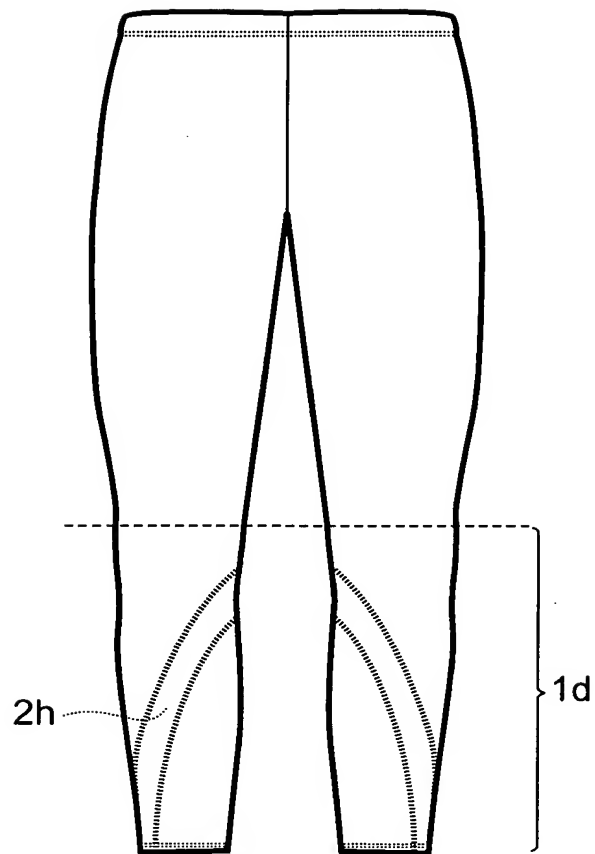


Fig.8

1
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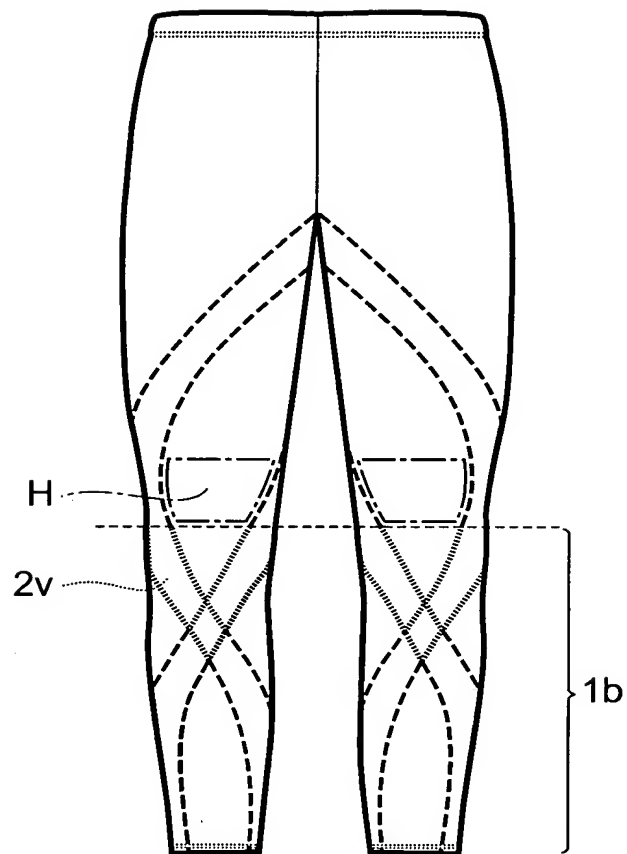


Fig.9

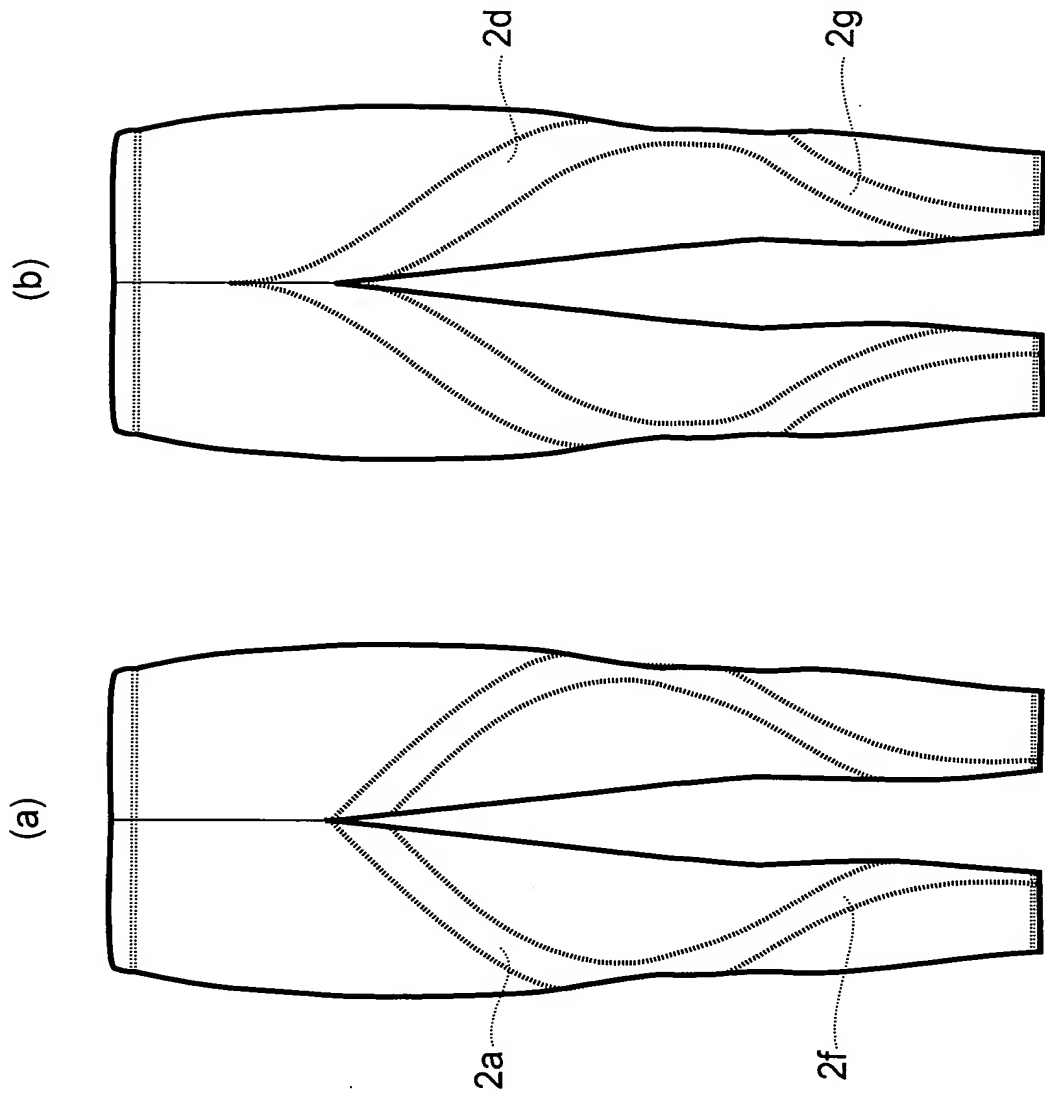


Fig.10

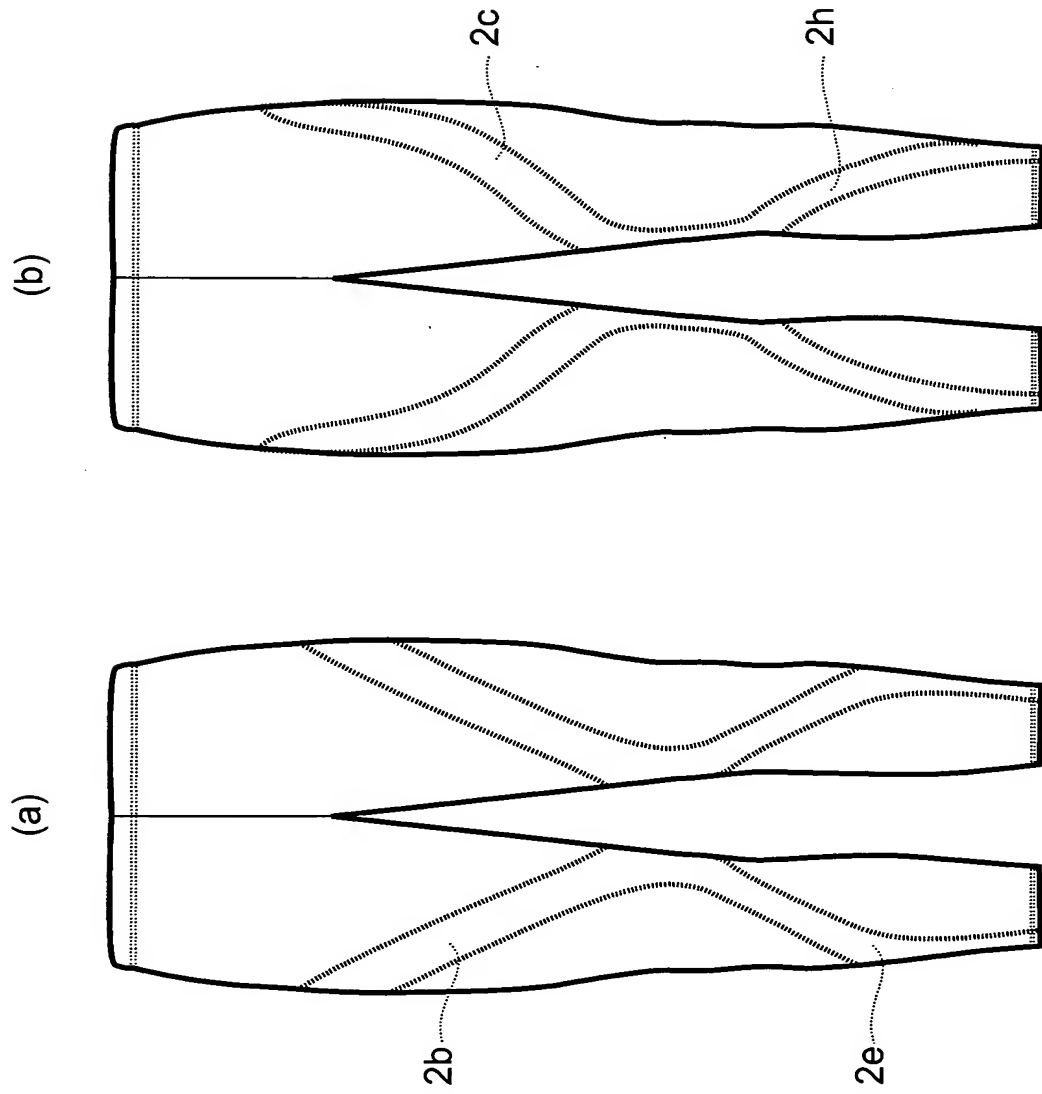


Fig. 11

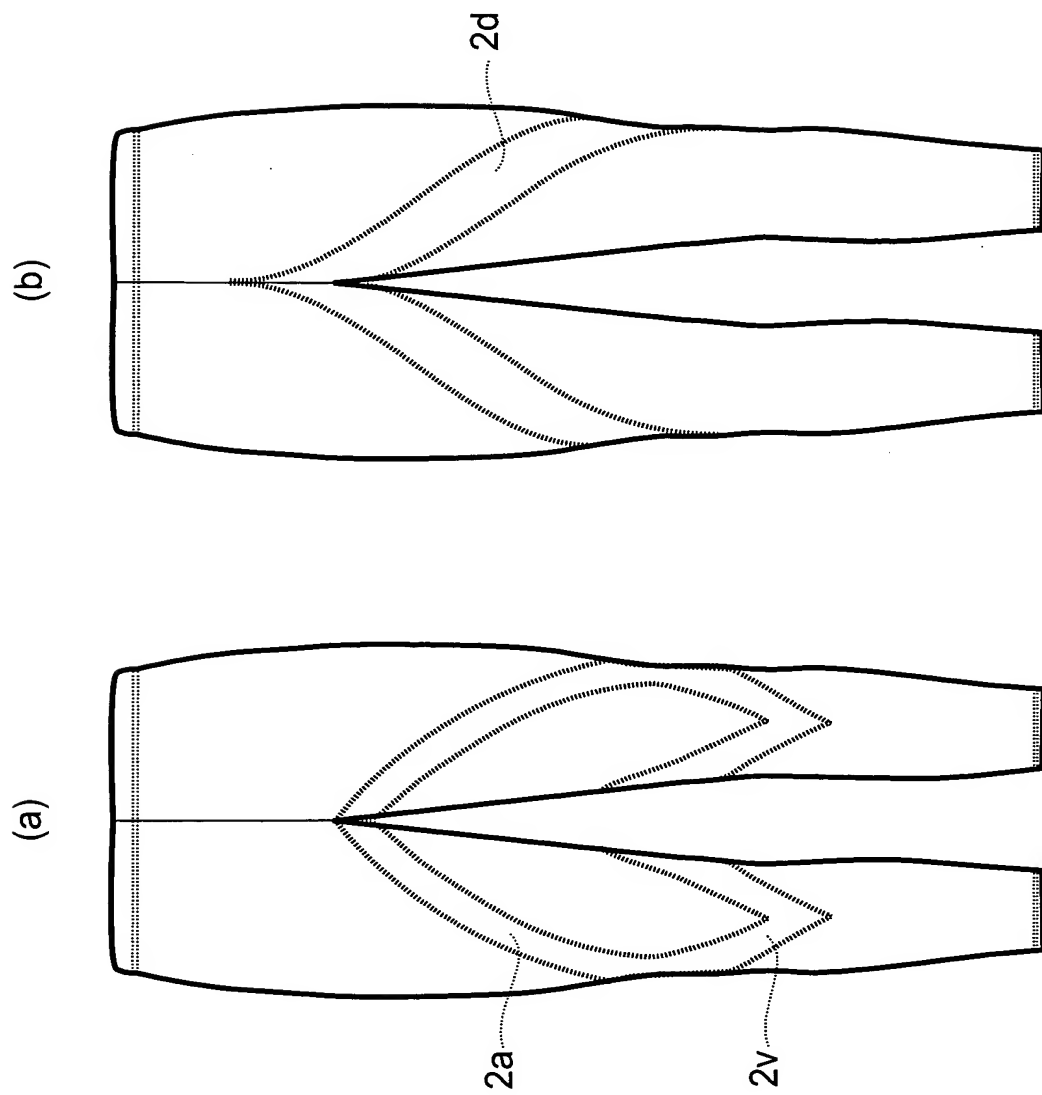


Fig.12

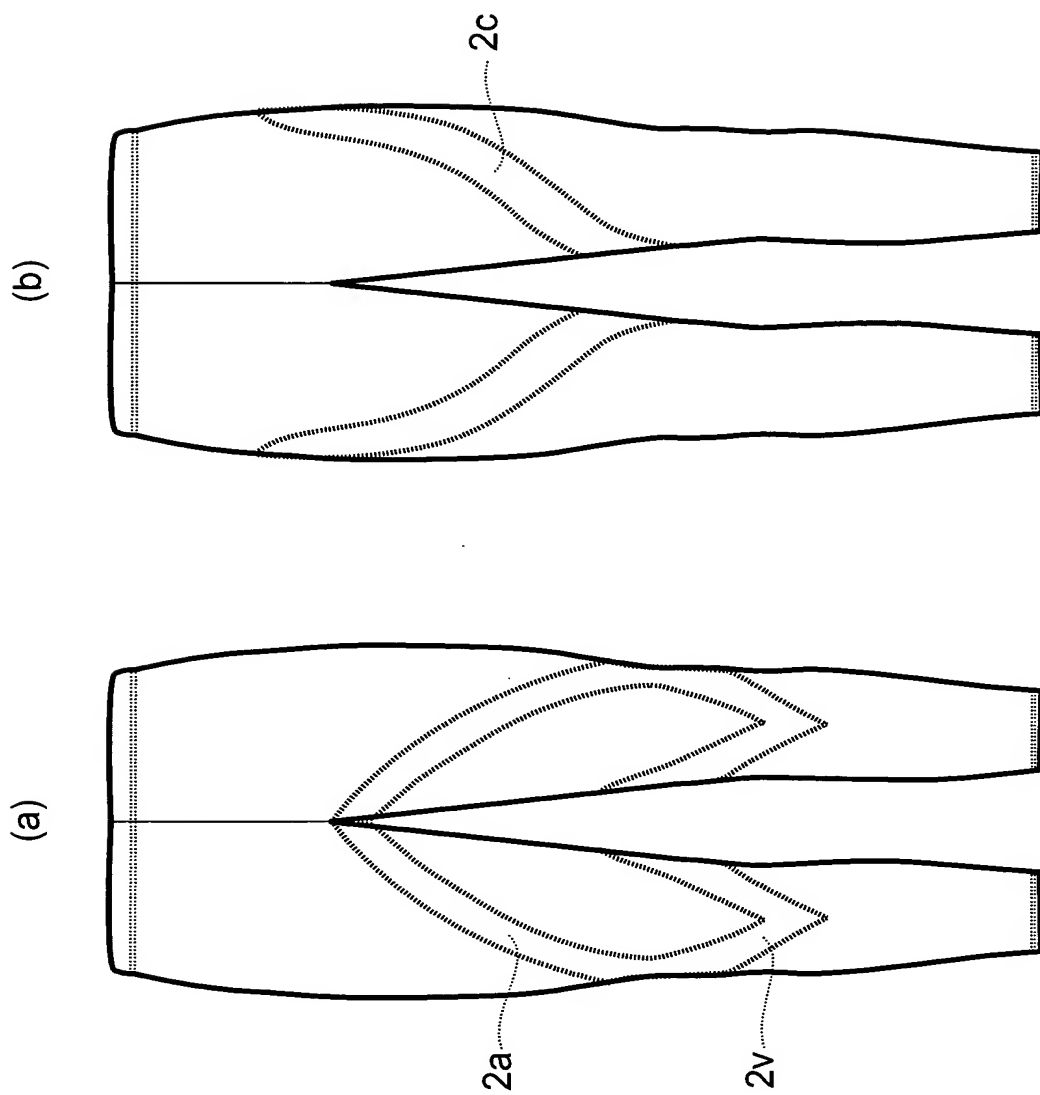


Fig.13

